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Effective IT governance Mechanisms in Higher Education Institutions: An empirical study

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Abstract: Particular attention to IT Governance is required when the pervasive use of technology has created critical dependencies on IT for organizational performance and prosperity. This study attempts to assess the importance of specific mechanisms for the effectiveness of IT governance in the context of higher educational institutions. Using a qualitative approach with in-depth interviews and document analysis to collect data, a study was carried out across several countries. A mechanism in each type (structure, process, and relational) emerge as quite important: IT Strategy Committee (structure), IT Strategic Planning (process) and IT Leadership (relational).

Keywords: Mechanisms, IT Governance, Impact, Higher Education, interviews.

1. Introduction

As we can see in the annual surveys of the Society for Information Management, when looking at the last four years, IT governance has been ranked among the top five most time-consuming activities for CIOs (David et al., 2019).

IT Governance has been defined as "an actively designed set of IT governance mechanisms that encourage behavior consistent with the organization's mission, strategy, values, norms, and culture" (Weill & Ross, 2004, pp. 3-4). Different sets of IT governance mechanisms have already been identified in the financial (R. Pereira, Almeida, & Silva, 2014), healthcare (R. Pereira, Silva, & Lapão, 2014) or higher education (I. Bianchi, Sousa, Pereira, & Hillegersberg, 2017).

Several studies have shown a positive impact of effective governance of IT on organizational performance and profitability (Chong & Duong, 2017; G.L. Lunardi, Maçada, Becker, & Van Grembergen, 2016). On the other hand, ineffective IT governance might affect the organization's performance, quality of services, and management of operations and costs (Ali & Green, 2012; Jewer & McKay, 2012; Pang, 2014). In universities, ineffective

ITG might affect the quality of teaching, research and management of internal processes (e.g. access to online courses, software, academic databases, etc.).

There are few studies identifying individual effective IT governance mechanisms (G.L. Lunardi et al., 2016; Turel, Liu, & Bart, 2019), in particular in higher education institutions. Therefore, this article aims at analyzing how effective are the mechanisms of structure, process and relational in a higher education context.

This article is structured as follows: the next section introduces the theoretical background to understand IT governance at universities and the effectiveness of IT governance mechanisms. Then, the research methodology is presented with data collection and data analysis. The final section presents the conclusion with theoretical and managerial implications, as well as limitations and future research.

2. Background

IT Governance involves a set of high-level definitions, such as principles, values, and goals, operationalized through mechanisms (Wiedenhöft, Luciano, & Pereira, 2019). These mechanisms are a practical manifestation of these high-level definitions and contain day-by-day activities as a way to execute the governance of IT in practice. An IT Governance framework may be deployed using a set of mechanisms including structure, processes, and relational mechanisms (De Haes & Van Grembergen, 2004, 2005, 2009; Peterson, 2004; Weill & Ross, 2004).

Moreover, according to Tonelli et al. (2015), the results show that IT governance mechanisms can bring different results in different contexts.

Information Technology has become crucial for higher education institutions in teaching, research, and management issues (I. S. Bianchi & Sousa, 2016; Khouja, Rodriguez, Ben Halima, & Moalla, 2018; C. Pereira, Ferreira, & Amaral, 2018). Moreover, IT can be a strategic tool for universities and have an enormous impact on educational performance, learning systems, research productivity, experiences with students, projects of internationalization and interaction with universities from other countries.

IT governance is an essential and important area of study in Information Systems, and fortunately has gained more attention recently (Joshi, Bollen, Hassink, De Haes, & Van Grembergen, 2018). However, empirical studies in this field are still scarce, particularly in universities as identified in previous research (e.g. Khouja et al. (2018), Waheed et al. (2018), Oñate-Andino et al. (2019)).

2.1. Effective IT Governance Mechanisms

From a literature review, regardless of the industry sector, 46 mechanisms were identified and classified as structures, processes and relational mechanisms for IT governance. The process of identifying each mechanism was a huge endeavor, trying to reconcile several designations and understanding of every mechanism across many papers.

To assess the importance of each mechanism, 27 papers were identified accounting for 34 case studies that presented some empirical evidence of the effectiveness of some mechanisms for IT governance at higher education institutions.

To assist in the process of identifying the mechanisms implemented across several case studies in higher education institutions, the software NVIVO was used (Bazeley & Jackson, 2013). Every article was imported in "PDF" format to NVIVO and using the function "Query-> Text Search, the name of each mechanism was searched, for instance, "IT Strategy Committee", "Service Level Agreement" or "SLA", "Partnership Rewards and Incentives" and all the remaining from the set of 46 mechanisms.

To classify each mechanism regarding its effectiveness, we adopted the following: "effective" (if the mechanism is implemented and has a positive impact on IT governance or if it is recommended in the institution; "not effective" (if the mechanism is implemented and has a negative impact on IT governance in the institution); "no significant results" (if the mechanism is implemented but no positive or negative impact has been found in the institution).

Quotes were identified for all mechanisms. For instance, "IT strategy is necessary to be clear and understood by the board of directors" (Fraser & Tweedale, 2003) may imply that an IT strategy committee would be effective to ensure the IT strategy on the agenda of the institution. Table 1 shows the results from the analysis of effective IT governance mechanisms reported in the 34 case studies found in the literature review.

Mechanisms	Empirical Results	References
IT strategy committee	Effective	Fraser and Tweedale (2003), Albrecht & Pirani (2004), Ko and Fink (2010), Wilmore(2014), Ajayi and Hussin(2016)
Strategic information systems planning	Effective	Fraser and Tweedale (2003), Albrecht and Pirani (2004), Bhattacharjya and Chang (2006), Ajayi and Hussin (2016)
Service level agreements	No significant results	Ko and Fink (2010)
IT leadership	Effective	Ko and Fink (2010), Wilmore (2014)

Table 1 – Effective ITG mechanisms from Literature

Regarding the IT governance mechanisms' effectiveness in the literature review, some conclusions can be drawn. The IT strategy committee is pointed out as the most essential committee for IT governance in case studies across different countries. Indeed, the strategy committee has the mission of ensuring that IT is on the agenda to align with the business. Several authors stress the importance of having strategic information systems planning according to business needs. The resulting plan has to assure that priorities and investments of the IT area align with the mission, objectives, and goals of the organization.

Authors such as Fraser and Tweedale (2003), Albrecht and Piran (2004), Bhattacharjya and Chang (2006) and Ajayi and Hussin (2016) stress the importance of an IT plan for IT governance and business-IT alignment. Findings regarding SLA in accordance with Ko and Fink (2010) show that SLAs at universities have not a significant positive result in practice when implanted. Thus, it does not affect positively the IT performance.

Another mechanism, IT Leadership, is also noted in several articles as essential for IT governance. Proactive strategic leadership is essential for effective IT governance in universities. The next section presents the research methodology to assess how effective are the mechanisms presented in Table 1 for IT governance at universities.

3. Research Methodology

Few studies attempted to analyze the effectiveness of particular IT governance mechanisms in higher education institutions. This study intends to contribute to increase the knowledge about the effectiveness of four specific mechanisms with a confirmatory case study. A confirmatory case study is suitable for this type of study since it aims to confront a list of mechanisms previously identified in the literature with the effectiveness perceived by the practitioners.

Given the purpose of this study, we have one mechanism for structure, two for processes, and one for relational. The choice is due to the following reasons. First, we want to analyze the importance and effectiveness of these mechanisms for this type of industry. Second, the literature provides few studies analyzing these mechanisms. Lastly, we want to show that the effectiveness of these mechanisms may be different in this type of industry.

This study adopts an inductive strategy using qualitative data from semi-structured interviews to collect data from different points of view (Myers, 1997) building upon the practical experiences from key actors in the university context (Yin, 2013).

3.1. Data Collection and *Data Analysis*

Across three different regions, South America and Europe, ten universities were selected for semi-structured interviews. The interviews were carried out with CIOs, IT Coordinators, and IT Directors since they are the IT decision-makers at top management and medium levels responsible for IT issues. Table 2 shows the profile of each interviewee and Table 3 some quotes from the interviews.

I	Region	Position	Education	Experience in IT (years)	Experience in the position (years)	Duration of Interview (hours)
1	Europe	CIO	Master	25 or more	3 or less	1.5
2	Europe	CIO	Master	25 or more	10 or more	1.5
3	South America	IT Coordinator	Master	14-20	4-6	3.0
4	South America	IT Coordinator	Master	14-19	3 or less	2.5
5	South America	IT Coordinator	Master	14-19	4-6	0.5
6	Europe	IT Director	Master	20-24	3 or less	2.0
7	Europe	IT Director	Master	14-19	3 or less	1.5
8	Europe	IT Director	Master	25 or more	10 or more	1.5

I	Region	Position	Education	Experience in IT (years)	Experience in the position (years)	Duration of Interview (hours)
9	South America	IT Coordinator	Master	14-19	4-6	3.0
10	South America	IT Director	Master	14-19	10 or more	2.5

Table 2 – Information about interviewees

Mechanisms	I	Quotes from interviews
IT Strategy Committee	3	*"**The strategy committee is the most important mechanism**. Strategy is the main issue in IT."*
	7	*"We haven't implemented the IT strategy committee. But, it is **important** to have a strategy committee to **define the strategy clearly**. "*
	9	*"It is **important** to have this committee to **define such decisions and practices in the institution** and the best ways for IT."*
	3	*"**The strategy committee is the most important mechanism**. Strategy is the main issue in IT."*
Strategic Information Systems Planning	3	*"The plan should be more effective in practice. The plan is **to get resources in the strategic** plan in the university. Currently, **the board does not give proper attention to this plan...** The plan is **a tool to justify things**...The plan is **really important.**"*
	7	*"Currently, we do not have a plan. We had a plan for four years last year. A **plan is an interesting guide**. It is enlightening and **very useful.**"*
	9	*"We have (...) a strategic plan for IT. The plan is following the strategic plan by the university. Each period of the strategic plan of the university, we organize or **IT plan to align with the business goal**."*
Service Level Agreement	1	*"SLA is implemented but could be improved. It is hard to implement the effectiveness of this instrument in general or in my organization. Here this **instrument** is **not very effective** so this instrument is not applicable."*
	3	*"We have SLA only for IT outsourcing such as a printer service. It is **difficult to implement** SLA because the people do not register correctly on the system. SLA **does not impact the loss to the institution**. If we do not achieve the SLA defined on time, it is not significant".*
	7	"The SLA was defined to be fulfilled. If it does not comply, it does not affect financial loss for the institution."
IT Leadership	3	*"It is **important to have leadership in the IT department**. However, sometimes it depends on university management and who is in this position".*
	4	*"From my point of view, it is **essential to have a person as a leader that pushes and motivates your team."***

Table 3 – Quotes from Interviews

The interviews were conducted between August of 2017 and May of 2018. The questionnaire to frame the interview was developed in four parts: the first part, with general questions about the institution; the second part, with personal questions about the interviewee; the third part, with questions regarding the level of effectiveness of IT governance mechanisms. The question regarding the level of effectiveness was repeated for each one of the 46 mechanisms.

The list is well known in the literature (Almeida, Pereira, & Silva, 2013; De Haes & Van Grembergen, 2009) and has been adopted in other studies (Ko & Fink, 2010; Qassimi & Rusu, 2015; Tonelli et al., 2015). In this study, we are just analyzing some particular mechanisms.

In qualitative analysis, the text and image data are so dense and rich, not all information can be used in the analysis (Creswell, 2013). Thus, in the data analysis, the researcher needs to focus on the representative and important data regarding the topic of study.

To acquire more insights from the data, Creswell (2013) suggests to aggregate data into a small number of themes. The software "NVIVO" (version 11.3.2 for mac) was used to transcribe and analyze the qualitative data. We followed an inductive strategy in a study that adopted a qualitative approach using content analysis. Three main pre-defined categories were created to code the data (Bazeley & Jackson, 2013): Structure, Process, and Relational Mechanisms. Such data enabled us to identify the code. Table 4 provides information on this analysis.

Category	Sub-Category	Code
Structure	IT Strategy Committee	IT Strategy is the most important mechanism; it is very important to define a strategy; members with different expertise
Process	Strategic Information System Planning	Tool to get funding; tool to justify IT issues; the most important IT document needs to be summarized with affordable IT goals to be reached; Plan for each year
	Service Level Agreement	The instrument is not very effective; it is difficult to implement; it does not impact on the loss to the institution; it's necessary to fulfill the SLA; if it does not comply it does not affect financial loss.
Relational mechanism	IT Leadership	It depends on the person that is in the position; a leader to motivate people is important;

Table 4 – Analysis from Interviews

The next section presents the discussion of the IT governance mechanisms.

4. Discussion and Findings

The first structure mechanism analyzed is the IT strategy committee. The strategy committee is pointed out by interviews as an effective IT governance mechanism with a positive impact on IT performance. It is quite obvious that strategy is in the top concerns

by the managers. The definition of an IT strategy at the institutional level is mentioned as one of the most important mechanisms for IT at universities

(Albrecht & Pirani, 2004). Hence, the strategy is also pointed out as the main concern in most case studies.

Another important reason identified in the case studies is the importance of having an IT strategy committee to align IT with the business. Additionally, IT must have the organization credibility operating at a high maturity level and in the long-term, not just short term and in crisis. Therefore, it is necessary to define clearly an IT strategy (Albrecht & Pirani, 2004; Fraser & Tweedale, 2003).

Even though some universities analyzed do not have a formal strategy committee at the institutional level and the strategy is defined in the IT department, there is a consensus regarding the importance of strategy. The results show that an IT strategy committee is crucial to ensure that IT is on the agenda at the institution, to define the budget and investment in IT, to have a plan for the long term, and to define priorities in different areas of teaching, learning and administrative areas.

Thus, to ensure that the IT strategy is on the agenda at the institution, it is necessary to create an IT strategy committee composed of administrative staff, academics, and students.

The second mechanism analyzed is the Strategic Information Systems Planning (SISP) leading to an IT Strategic Plan. It is a process mechanism that is pointed out as important in most studies. However, as noted by some interviewees, the plan sometimes does not get the necessary attention. Universities, as complex organizations, need to develop a long-range strategic plan to justify funding requests for research and teaching activities as well as projects. This document is a crucial tool to justify IT activities at the institutional level and must have the recognition of senior management of the institution, in this case, the rector, pro-rectors and directors and administrative people. This document provides guidance for the priorities and investments of the IT area aligned with the mission, objectives, and goals of the organization. In other words, it is an enabler for IT and alignment with the institutional strategy (De Haes & Van Grembergen, 2009). Moreover, the organizations should maintain a detailed IT strategic plan that incorporates business requirements. In the case of universities, there should be a plan which encompasses the activities of teaching, learning, and administrative tasks.

Authors such as Fraser and Tweedale (2003), Albrecht and Piran (2004), Bhattacharjya and Chang (2006) and Ajayi and Hussin (2016) stress the importance of an IT plan for IT governance and business-IT alignment. These findings have identified that the IT strategic plan in the university should be a simple, objective and concise document to be discussed at the IT strategy committee and approved by the board of institutions such as the rector, directors and administrative staff. IT strategy must cover all areas of the university. Ismail (2008) argues that the plan should provide an aggressive and bold, yet thoughtful and measured vision for how IT should be developed, used and applied to support the university's main activities such as research and academic, teaching and learning, and administrative support services.

Additionally, Jairak et al. (2015) complement that the IT plan is an essential document in the institution related to the vision, mission, and strategy. At the University of Oxford

(2015), number one in the ranking of Times Higher Education, the IT strategic plan has only fifteen pages. It is a summarized document displaying all areas (research, education, support administrative functions, infrastructure and IT staff and skills among others) that IT strategy needs to cover at the institution.

The third mechanism analyzed is Service Level Agreement (SLA). Findings reveal a consensus between the interviewee that the SLA does not seem an essential and effective mechanism for universities. The results of this study show that SLA does not impact on ITG at universities. The effectiveness of SLA in universities is perceived as low. Moreover, the process mechanisms "SLA" is created to be achieved. If the defined time is not achieved in universities, it is not significant and does not impact on the institution. SLA is more so an internal instrument to control the employees and measure the quality of service provided. However, interviewees have awareness that it is important to define time for the services, at least for monitoring the internal performance or some IT staff members. Such results give information that is not effective in practice and also difficult to implement due to correctly filling the system. The empirical findings regarding SLA are in accordance with Ko and Fink (2010) and also show that SLAs at universities are not effective or pointed out without high relevance.

In contrast, the findings of the study by Silva et al. (2019) identified positive results on SLA in SMEs. The Service Level Agreement is a contract, between the provider and consumer of a service, aiming to define the acceptable and attainable service levels and the mutually approved set of quality indicators. It can be useful to guarantee that customers' expectations and provider's capability are mutually understood and accepted. In the context of SMEs, this mechanism can be extremely important since these organizations tend to outsource IT-enabled business solutions and their employees are usually unaware of the potential benefits and costs of IT.

The fourth mechanism is IT leadership, that is crucial to all types of organizations and is defined as "*the ability of the CIO or a member of staff in a similar role to articulate a vision for IT's role in the company and ensure that this vision is clearly understood by managers throughout the organization*" (De Haes & Van Grembergen, 2009). Nfuka and Rusu (2011) also stress that IT leadership has critical success factors for effective IT governance.

Findings from this study reveal that IT leadership is an important relational mechanism to take into account to have effective ITG. In the universities analyzed, the IT leader is usually the CIO, IT Director or IT coordinator. This position is responsible for making the bridge between IT and business as well as interacting with the board of the university. Empirical evidence shows that most universities require IT leadership from a person with a strong background and technical skills rather than a background in management education. In this sense, the IT strategy and projects to articulate IT internally sometimes depend on the vision of the person that is in this position.

To summarize, findings from this study show that it is crucial to have IT leadership to promote IT leading projects and motivate employees. Otherwise, IT at the university tends to stay in inertia without any innovation. Indeed, IT leadership is crucial for IT governance at universities as pointed out by several researchers such as Ko and Fink (2010) and Ajayi and Hussin (2016).

5. Conclusion

This research aimed at analyzing how effective were four particular IT governance mechanisms in a higher education context. Ten universities participated in this research. Interesting insights were collected from the interviews.

It became clear that universities have specificities and challenges that shape the way they should govern IT. However, regardless of their specificities, a structure such as an IT Strategy Committee, a process such as a Strategic Information Systems Planning and a relational mechanism such as IT Leadership, are perceived as effective and essential for IT governance.

6. Limitations and Future Research

This study has some limitations. First of all, the collected data was limited to ten universities. Second, only one executive was interviewed at each university. In this article, we took into account only how many times the mechanism was selected and we did not consider a ranking among them. The qualitative data collected from interviews and transcribed to NVIVO was not totally analyzed in this article and will be under examination for further research.

The authors will keep interviewing and collecting more data in universities from different countries (including private universities) as well as pursuing a validation of a list of ITG mechanisms using a greater sample in order to strengthen the outcomes of effective IT governance mechanisms at higher education institutions.

To really assess the impact of the mechanisms that were identified in this study and perceived as effective for organizational performance, a quantitative approach may be used in future work.

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